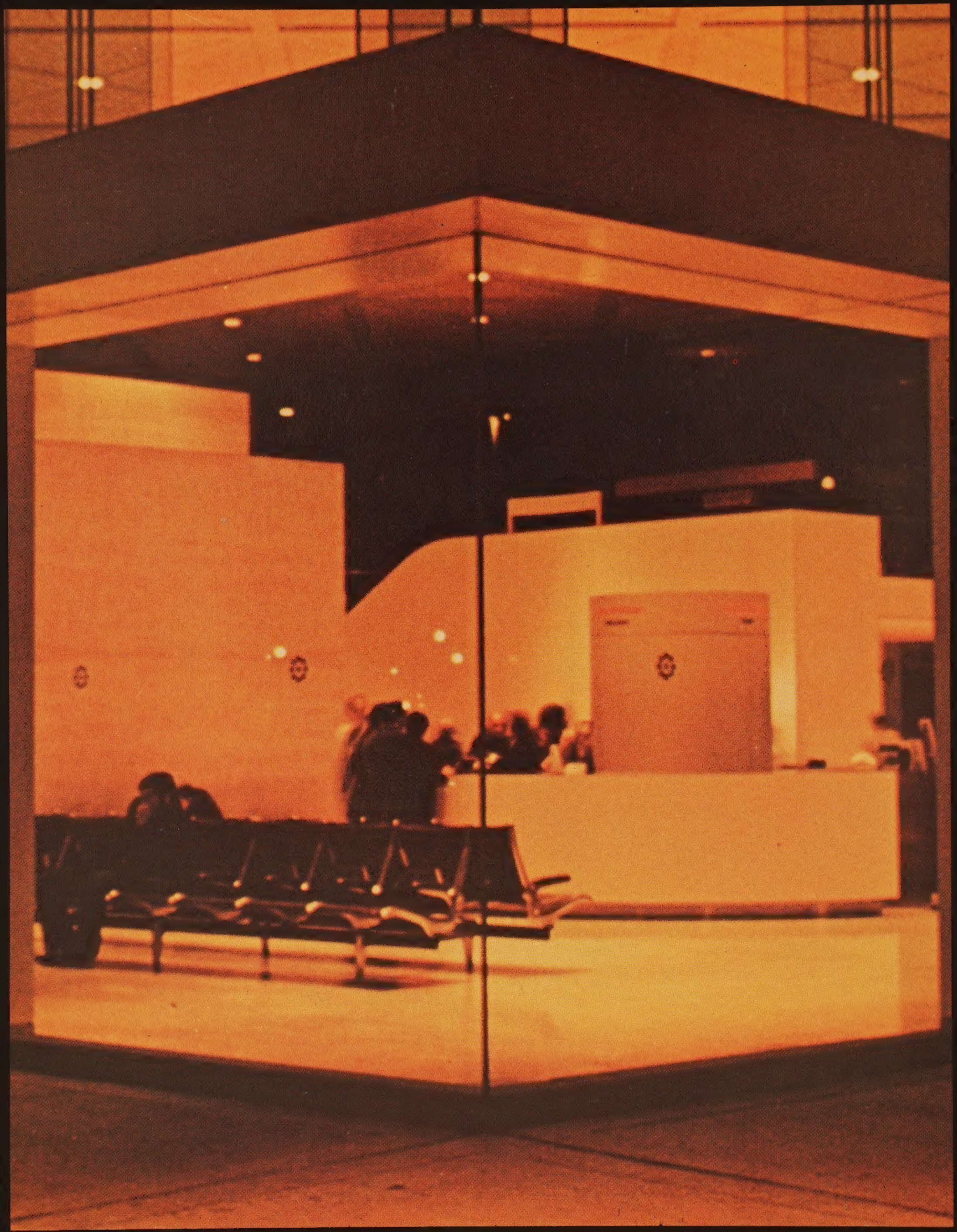
LOF BUTT-JOINT GLAZING

Butt-joint glazing has created a whole new freedom of design in architecture. With or without stabilizers, butt-joint glazing provides an uninterrupted flow of glass.

In the National Airlines Terminal at Kennedy International Airport, a system of large lights are butted together and supported vertically with glass mullions. The total use of glass provides a completely open view of the surrounding terminal area.

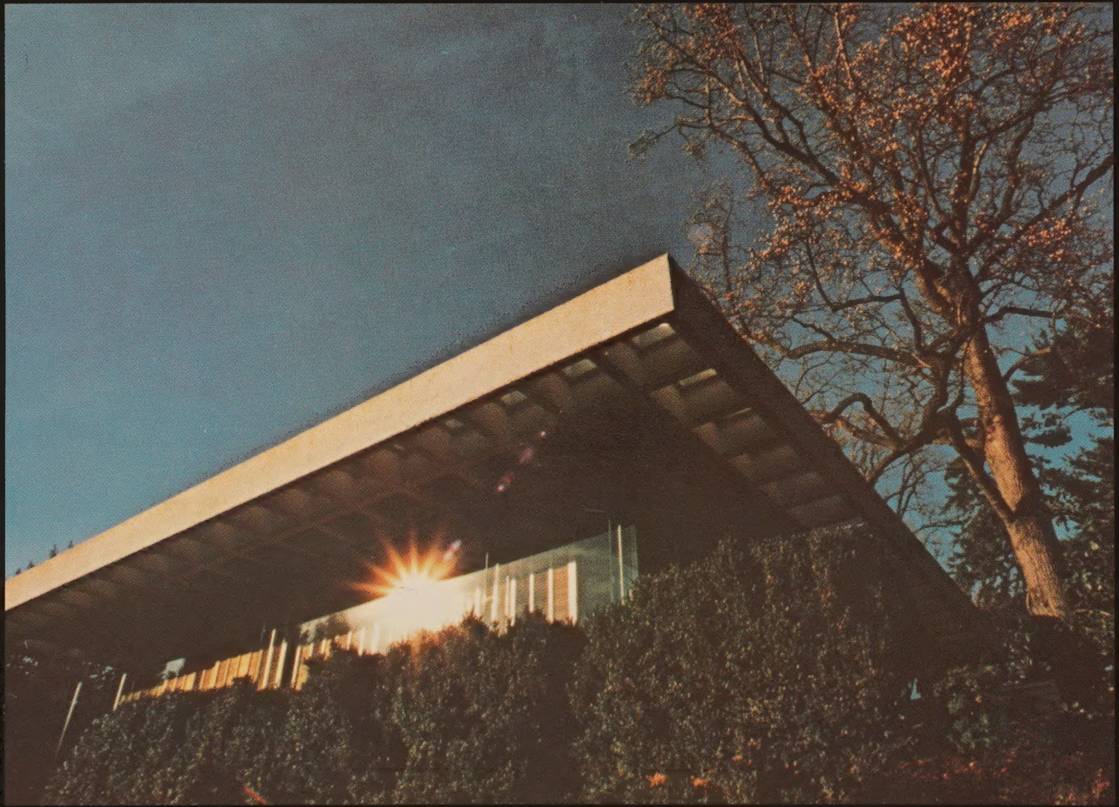
"We wanted to create a building that would understate itself ...so we chose a very simple, almost classical form. To assist the traveler, we decided the building should be as open and unobstructed as possible."
Eason H. Leonard
I. M. PEI & Partners



"When you use this kind of glazing, the effect is spectacular. Nothing blocks the view."
Eason H. Leonard
I. M. PEI & Partners

National Air Lines
I. M. Pei & Partners
New York City, N.Y.

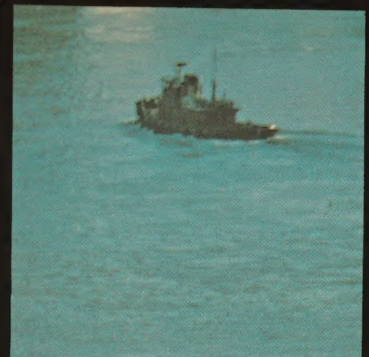
An example of butt-joint glazing with stabilizers: Prospect House on the campus of Princeton University. Here, the architect has chosen butt-joint glazing to compliment the interior with an uninterrupted panoramic view of the surrounding gardens. Since the building is used for dining and meetings, butt-joint glazing with stabilizers provides the open and relaxed atmosphere conducive to informal gatherings. The free flow of glass around the room allows the beauty of the grounds to become a natural part of the decor.



Prospect House
Princeton University

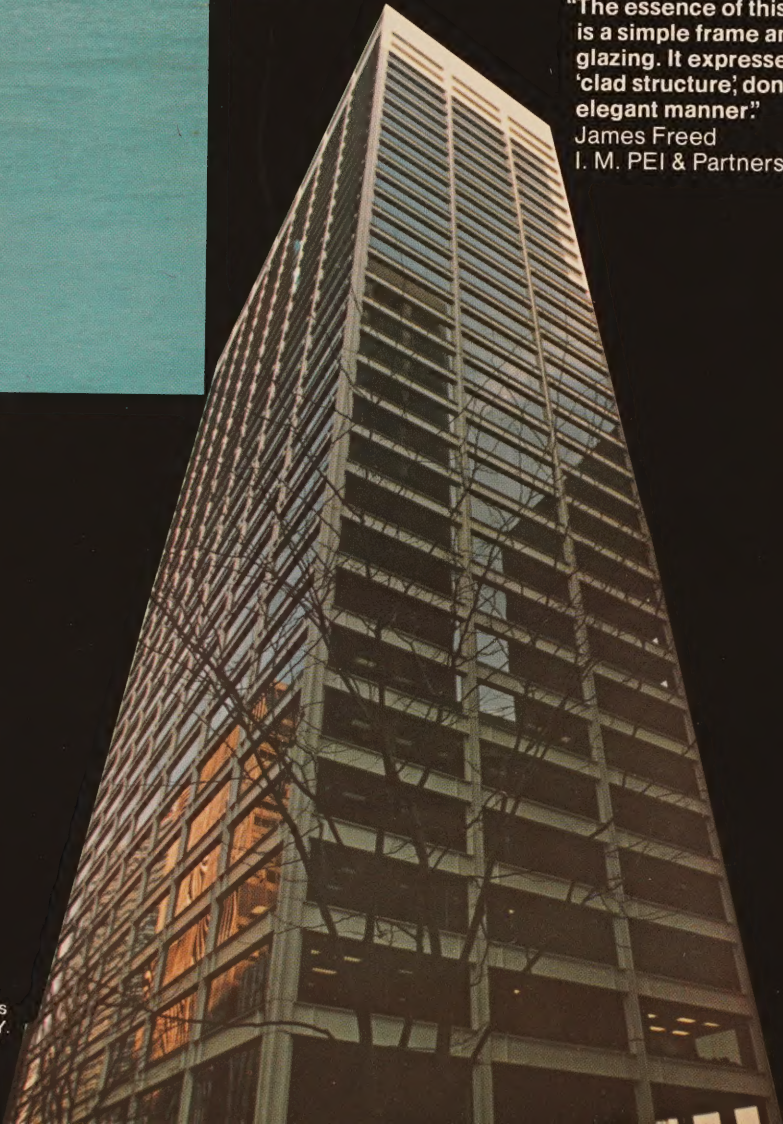
Butt-joint glazing with stabilizers goes beyond the traditional concept of "window"... with butt-joint glazing, the window is transformed into a wall of glass, providing architects with the opportunity to achieve a balance between the building design and the landscape.

"It is possible, even with a simple bay and enclosure design, to create an office building of quality... a building with elegance and personality."
James Freed
I. M. PEI & Partners



"The essence of this building is a simple frame and simple glazing. It expresses itself as a 'clad structure', done in a quiet, elegant manner."
James Freed
I. M. PEI & Partners

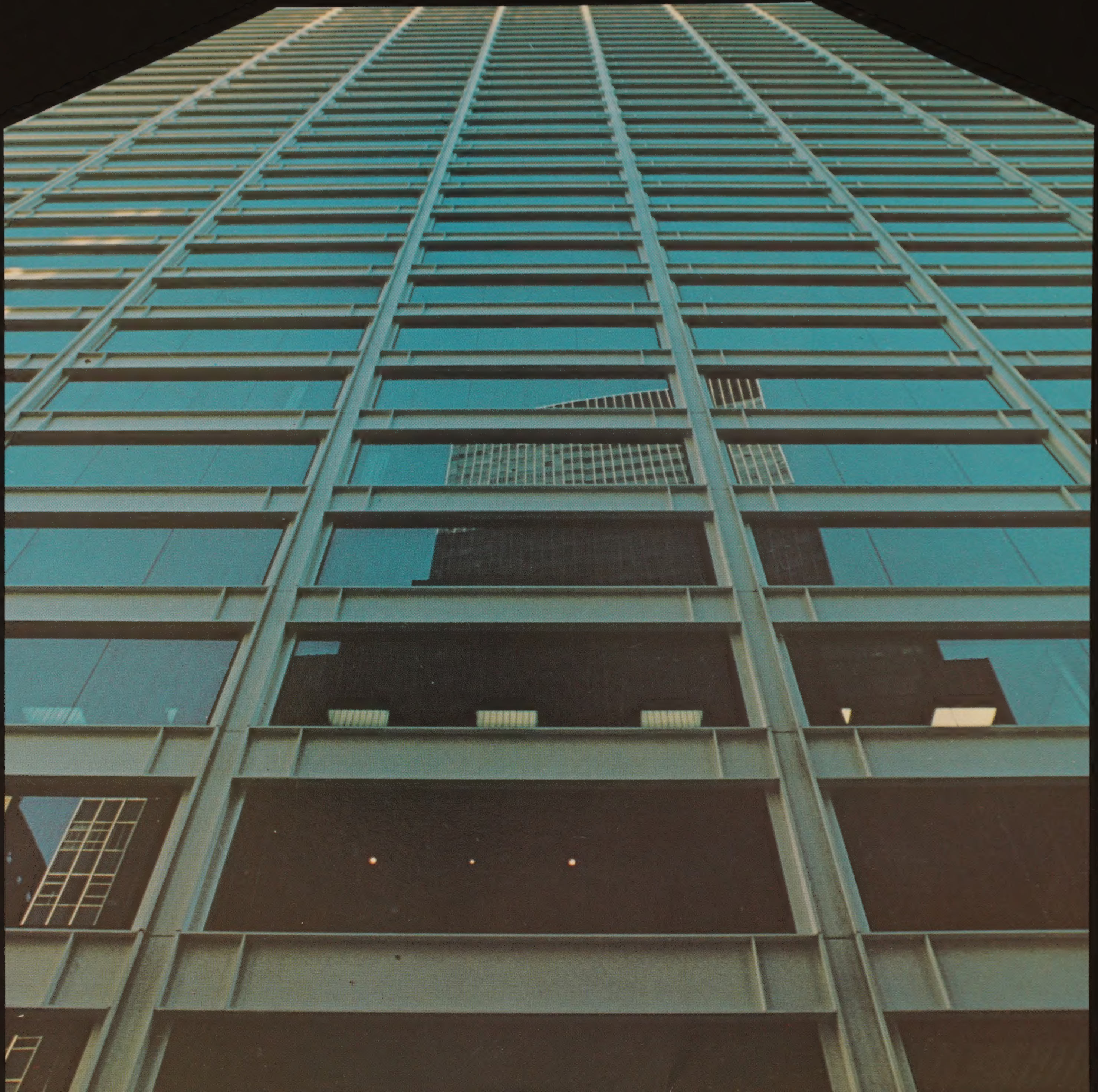
Butt-joint glazing emphasizes the design concept of 88 Pine. The glass becomes a transparent medium to let the surrounding environment inside.



88 Pine
I. M. Pei & Partners
New York City, N.Y.

There are parts of any city that are so crowded with buildings that all sense of perspective is lost. People who work in these congested business districts often have to fight a kind of architectural claustrophobia... the walls seem to push in from every side. The problem is how to design a building into a tight space... giving it room to breathe and giving the people an opportunity to live and work comfortably within the environment, without feeling closed in.

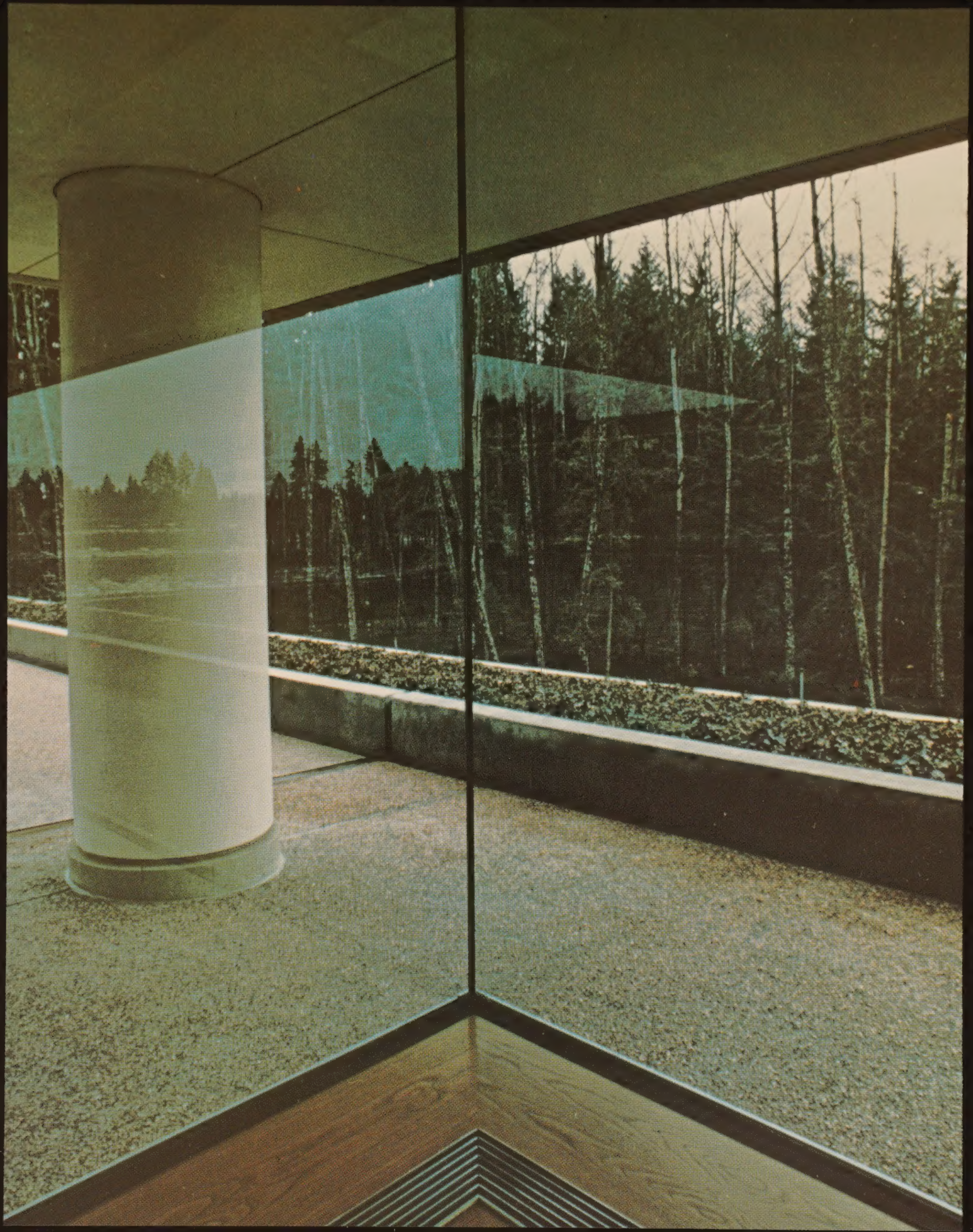
88 Pine is located in the heart of the Wall Street business district. To establish an identity for the building, the architects decided to eliminate as many building elements as possible.



The new Weyerhaeuser Company Corporate Headquarters Building in Tacoma, Washington blends into its natural environment so well that it is difficult to know where the building ends and the land begins. This was accomplished in spite of the fact that the building contains 358,000 square feet of floor space—the equivalent of a 37-story vertical office building.

To achieve this spectacular blend of building and environment, architects at Skidmore, Owings & Merrill chose as many natural building materials as possible.

"We hoped to go beyond traditional architecture. We wanted a total blend of building and landscape."
Charles Bassett, Partner
Skidmore, Owings & Merrill



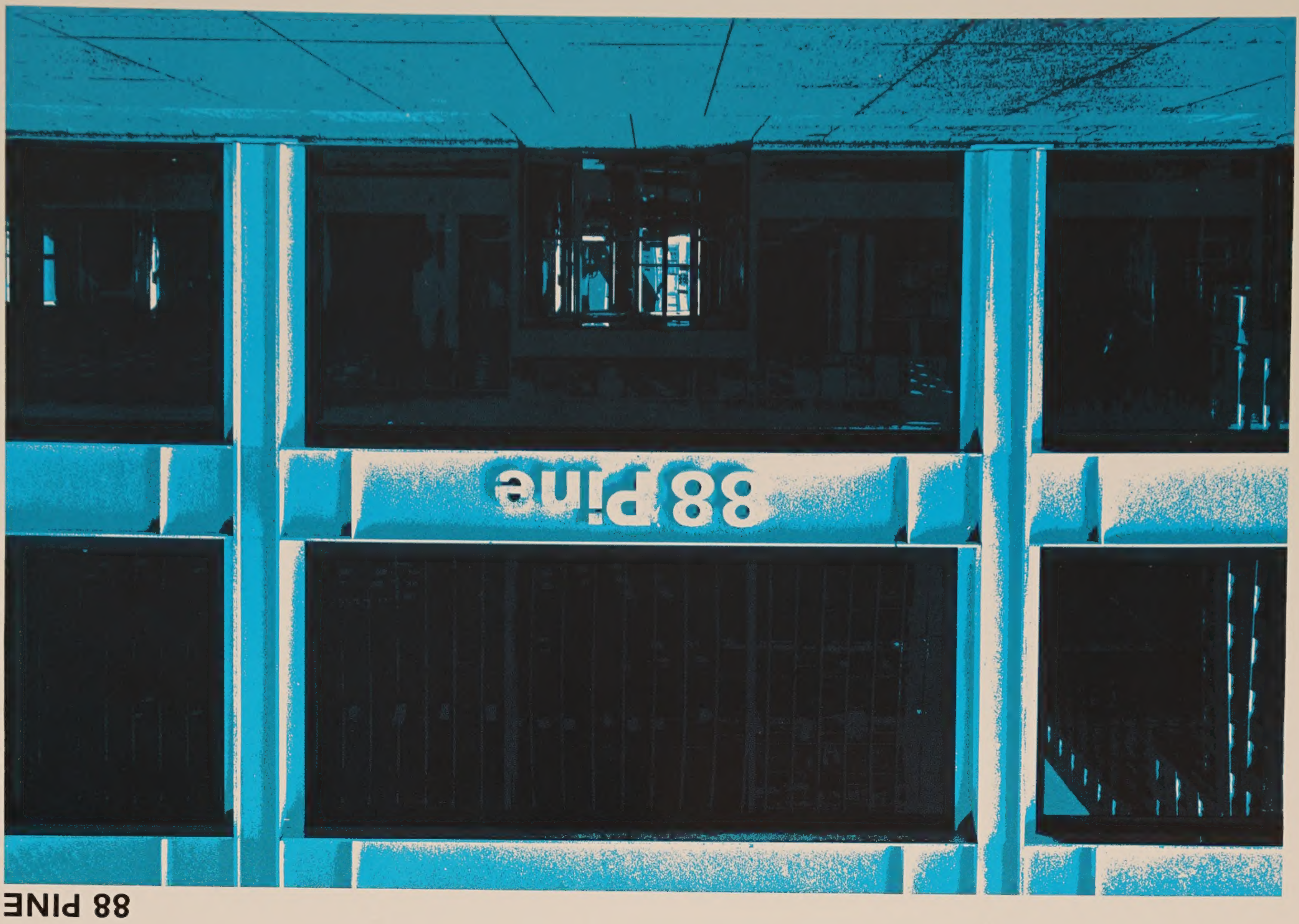
To compliment and heighten the visual effect of the building, a curtain wall of glass was designed into each of the building's five levels. This uninterrupted wall of glass stretches more than two hundred feet. Butt-joint glazing creates an impression of continuous flowing glass. There is no need for vertical framing since the edges of heavy-duty glass are "butted" together and sealed with a silicone adhesive.

"The building has what we like to call a 'high modesty threshold.' It's supposed to disappear... become a part of the forest."
Charles Bassett, Partner
Skidmore, Owings & Merrill

Weyerhaeuser
Skidmore, Owings & Merrill
San Francisco, California

88 PINE

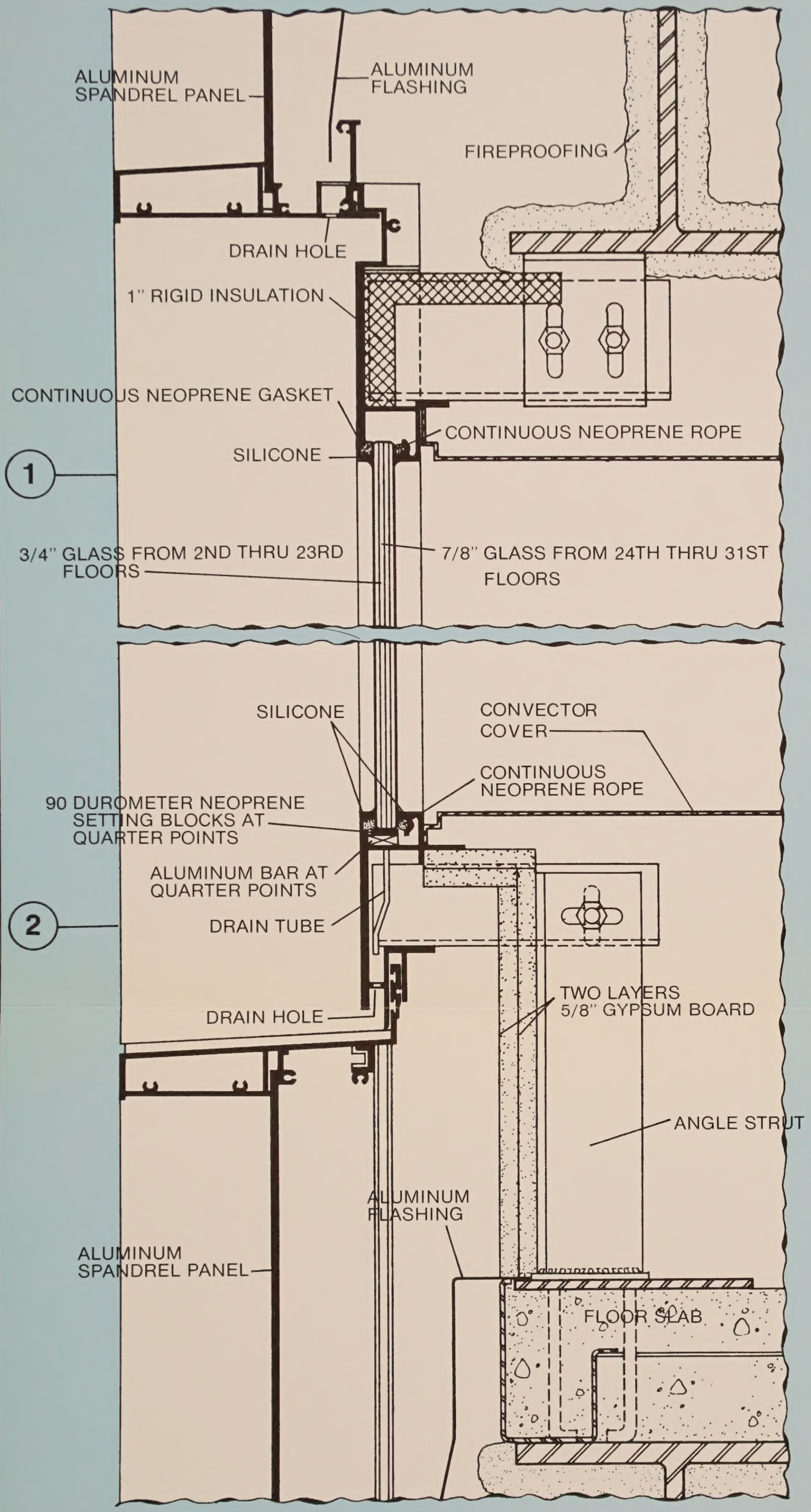
BUTT-JOINT GLAZING

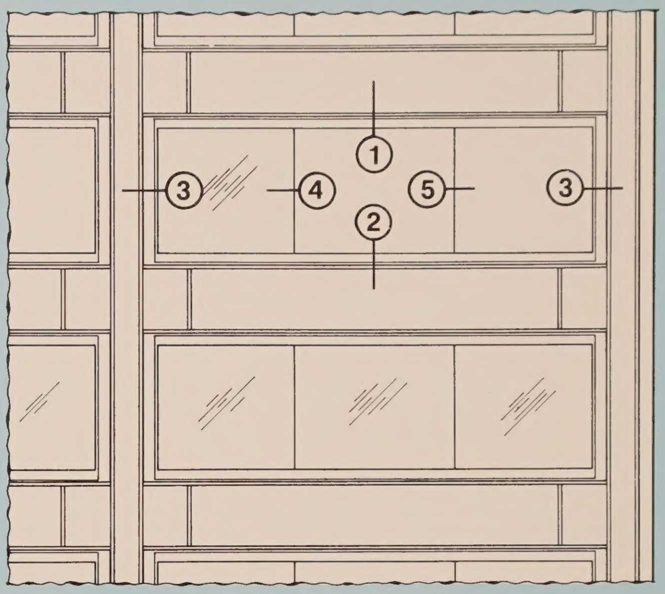


LIBBEY-OWENS-FORD COMPANY, 811 Madison Avenue, Toledo, Ohio 43695
(419) 242-5781

District Offices

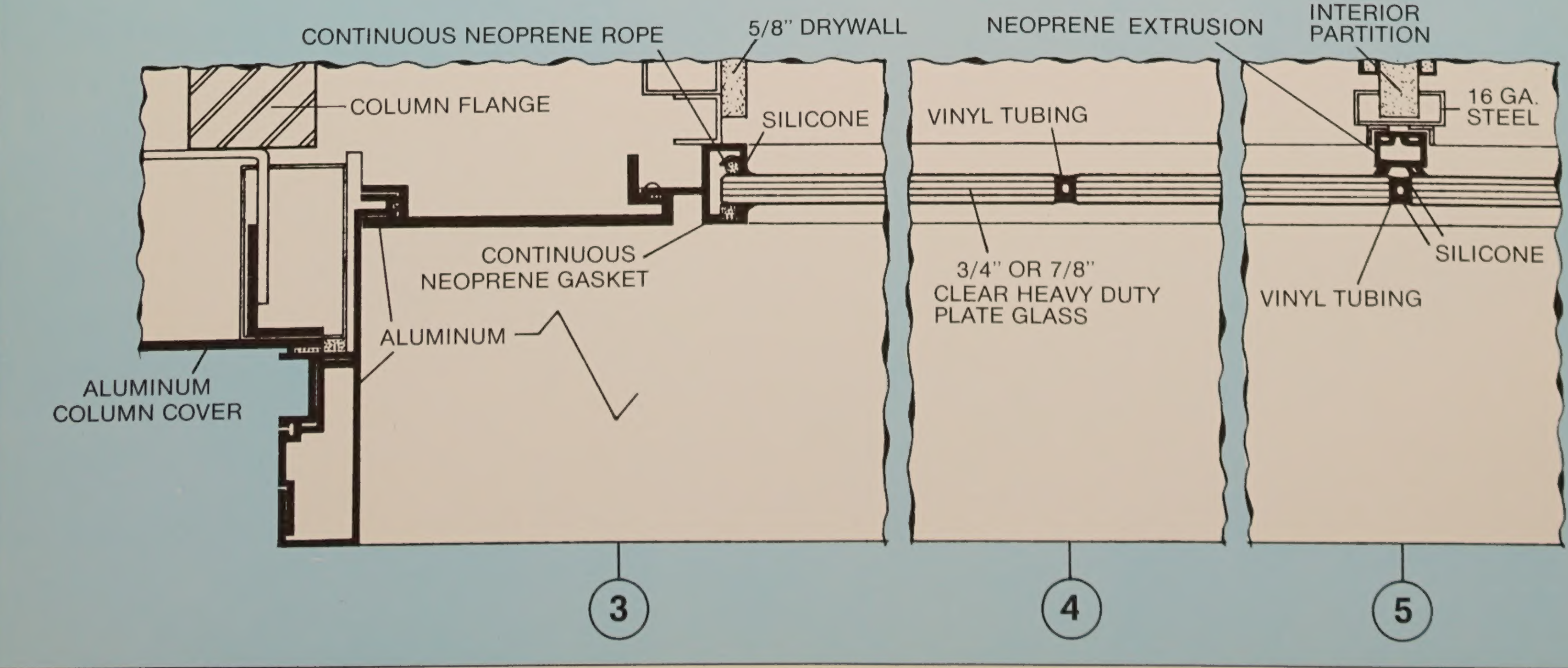
ATLANTA, GEORGIA 30309, 1819 Peachtree Road, N.E.,
(404) 355-2410
BOSTON (Chestnut Hill, Massachusetts 02167), 220 Boylston St.,
(617) 969-2900
BUFFALO (Amherst, New York 14226), 331 Alberta Drive,
(716) 838-3800
CHARLOTTE, NORTH CAROLINA 28209, 4530 Park Road, Suite 180,
(704) 525-4816
CHICAGO, ILLINOIS 60606, 10 S. Riverside Plaza, Room 822,
(312) 236-2490
CINCINNATI, OHIO 45241, 4055 Executive Park Drive,
(513) 961-8181
COLUMBUS, OHIO 43229, 665 E. Dublin-Granville Rd., Suite 202,
(614) 888-8740
DALLAS, TEXAS 75219, One Turtle Creek Village, Suite 424,
(214) 521-3782
DENVER, COLORADO 80202, 1700 Broadway, Suite 2106,
(303) 255-0395
DETROIT, MICHIGAN 48202, 610-611 Fisher Building,
(313) 875-0080
HOUSTON, TEXAS 77027, 2300 West Loop South, Suite 515,
(713) 621-1173
INDIANAPOLIS, INDIANA 46226, 8944 East 42nd Street, Suite 212,
(317) 897-4455 & 4456
LOS ANGELES, CALIFORNIA 90010, 3440 Wilshire Boulevard,
(213) 388-0641
KANSAS CITY (Prairie Village, Kansas 66206), 8340 Mission Road,
(913) 381-4686
MEMPHIS, TENNESSEE 38137, 5100 Poplar Avenue, Suite 2023,
(901) 682-4684
MIAMI (Fort Lauderdale, Florida 33311), 2530 W. Oakland Park Blvd., Suite 10-B
(305) 731-8980, (Miami (305) 949-1188)
MILWAUKEE (Wauwatosa, Wisconsin 53226), 11430 West Bluemound Road,
(414) 475-5700
MINNEAPOLIS, MINNESOTA 55435, 6750 France Avenue, Suite 324
(612) 920-5200
NEW ORLEANS (Metairie, Louisiana 70002), 3525 No. Causeway Blvd.
(504) 835-0381
NEW YORK (Fort Lee, New Jersey 07024), 222 South Marginal Road,
(201) 947-8000
OMAHA, NEBRASKA 68102, 110 North 14th Street, Suite 628,
(402) 341-4310
PHILADELPHIA (Bryn Mawr, Pennsylvania 19010), 14 South Bryn Mawr Avenue,
(215) 477-4120
PHOENIX, ARIZONA 85015, 1600 West Camelback Road, Suite 2-F,
(602) 264-9097
PITTSBURGH, PENNSYLVANIA 15237, 7805 McKnight Road, Suite 103,
(412) 366-7722
RICHMOND, VIRGINIA 23225, 6767 Forest Hill Avenue, Suite 306,
(804) 358-4906
ST. LOUIS, MISSOURI 63141, 11710 Administration Drive,
(314) 567-4416 & 4417
SALT LAKE CITY, UTAH 84111, 140 W. 2100 South, Suite 114,
(801) 467-8681
SAN FRANCISCO (San Mateo, California 94402), 66 Bovet Road, Suite 380,
(415) 341-7221
SEATTLE (Bellevue, Washington 98007), 14042 N. E. 8th,
(206) 747-9730
TOLEDO, OHIO 43614, 3536 Glendale Avenue, Suite F,
(419) 242-5781
WASHINGTON, D.C. 20006, 900 17th Street, N.W.,
(202) 296-5051





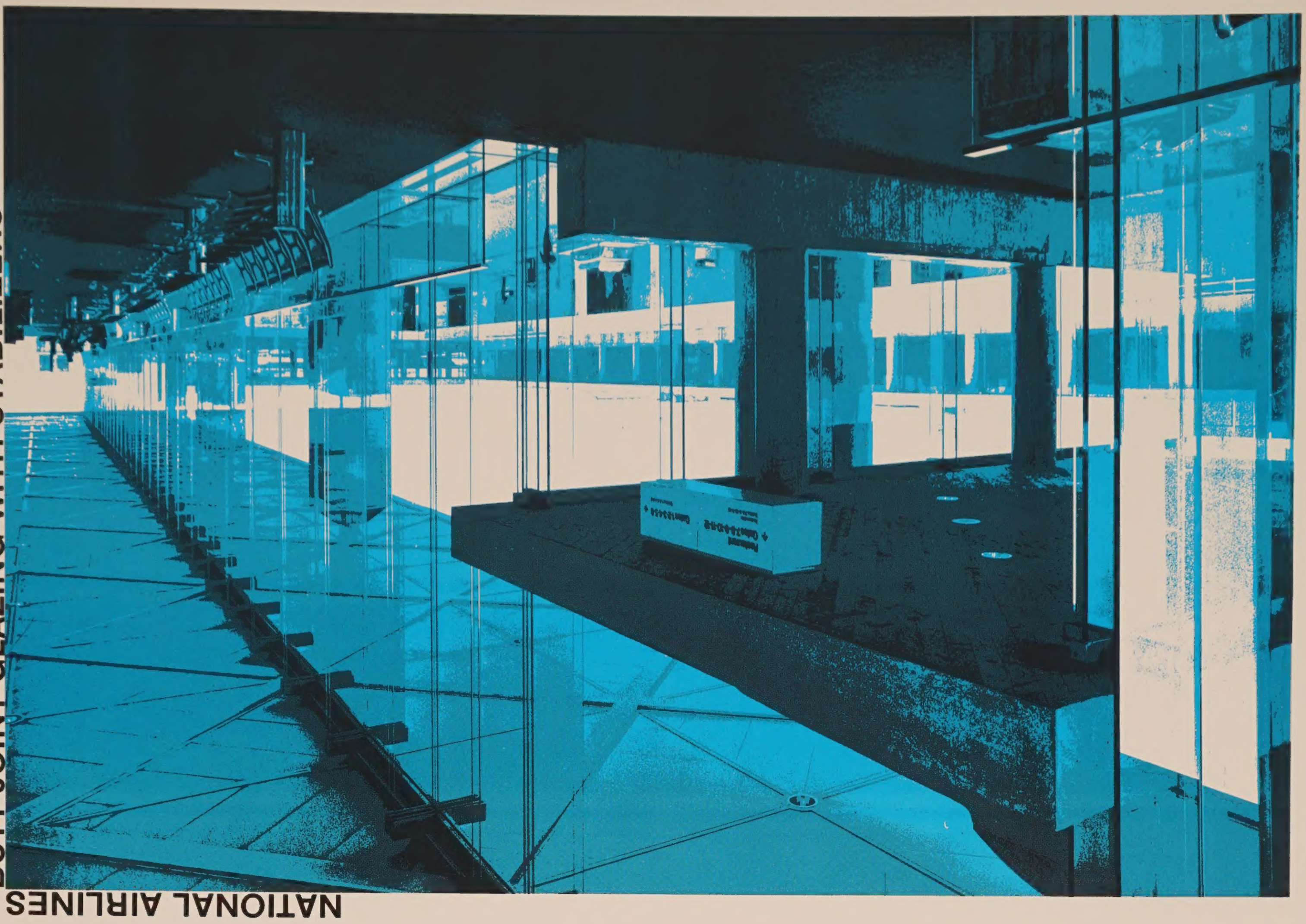
KEY ELEVATION

88 PINE
NEW YORK CITY



NATIONAL AIRLINES

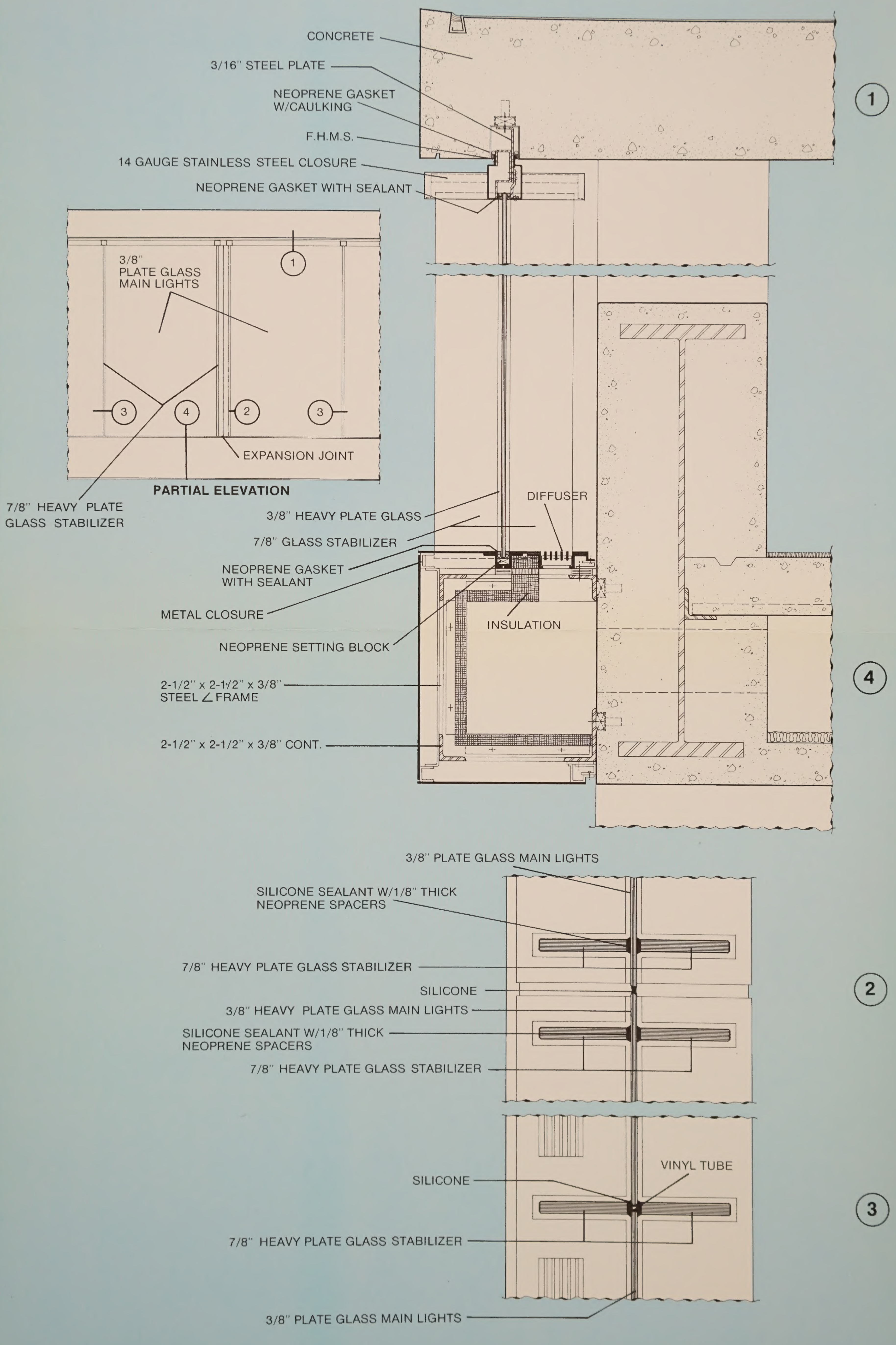
BUTT JOINT GLAZING WITH STABILIZERS



LIBBEY-OWENS-FORD COMPANY, 811 Madison Avenue, Toledo, Ohio 43695
(419) 242-5781
District Offices
ATLANTA, GEORGIA 30309, 1819 Peachtree Road, N.E.,
(404) 355-2410
BOSTON (Chestnut Hill, Massachusetts 02167), 220 Boylston St.,
(617) 969-2900
BUFFALO (Amherst, New York 14226), 331 Alberta Drive,
(716) 838-3800
CHARLOTTE, NORTH CAROLINA 28209, 4530 Park Road, Suite 180,
(704) 525-4816
CHICAGO, ILLINOIS 60606, 10 S. Riverside Plaza, Room 822,
(312) 236-2490
CINCINNATI, OHIO 45241, 4055 Executive Park Drive,
(513) 961-8181
COLUMBUS, OHIO 43229, 665 E. Dublin-Granville Rd., Suite 202,
(614) 888-8740
DALLAS, TEXAS 75219, One Turtle Creek Village, Suite 424,
(214) 521-3782
DENVER, COLORADO 80202, 1700 Broadway, Suite 2106,
(303) 255-0395
DETROIT, MICHIGAN 48202, 610-611 Fisher Building,
(313) 875-0080
HOUSTON, TEXAS 77027, 2300 West Loop South, Suite 515,
(713) 621-1173
INDIANAPOLIS, INDIANA 46226, 8944 East 42nd Street, Suite 212,
(317) 897-4455 & 4456
LOS ANGELES, CALIFORNIA 90010, 3440 Wilshire Boulevard,
(213) 388-0641
KANSAS CITY (Prairie Village, Kansas 66206), 8340 Mission Road,
(913) 381-4686
MEMPHIS, TENNESSEE 38137, 5100 Poplar Avenue, Suite 2023,
(901) 682-4684
MIAMI (Fort Lauderdale, Florida 33311), 2530 W. Oakland Park Blvd., Suite 10-B
(305) 731-8980, (Miami (305) 949-1188)
MILWAUKEE (Wauwatosa, Wisconsin 53226), 11430 West Bluemound Road,
(414) 475-5700
MINNEAPOLIS, MINNESOTA 55435, 6750 France Avenue, Suite 324
(612) 920-5200
NEW ORLEANS (Metairie, Louisiana 70002), 3525 No. Causeway Blvd.
(504) 835-0381
NEW YORK (Fort Lee, New Jersey 07024), 222 South Marginal Road,
(201) 947-8000
OMAHA, NEBRASKA 68102, 110 North 14th Street, Suite 628,
(402) 341-4310
PHILADELPHIA (Bryn Mawr, Pennsylvania 19010), 14 South Bryn Mawr Avenue,
(215) 477-4120
PHOENIX, ARIZONA 85015, 1600 West Camelback Road, Suite 2-F,
(602) 264-9097
PITTSBURGH, PENNSYLVANIA 15237, 7805 McKnight Road, Suite 103,
(412) 366-7722
RICHMOND, VIRGINIA 23225, 6767 Forest Hill Avenue, Suite 306,
(804) 358-4906
ST. LOUIS, MISSOURI 63141, 11710 Administration Drive,
(314) 567-4416 & 4417
SALT LAKE CITY, UTAH 84111, 140 W. 2100 South, Suite 114,
(801) 467-8681
SAN FRANCISCO (San Mateo, California 94402), 66 Bovet Road, Suite 380,
(415) 341-7221
SEATTLE (Bellevue, Washington 98007), 14042 N. E. 8th,
(206) 747-9730
TOLEDO, OHIO 43614, 3536 Glendale Avenue, Suite F,
(419) 242-5781
WASHINGTON, D.C. 20006, 900 17th Street, N.W.,
(202) 296-5051

BUTT-JOINT GLAZING WITH STABILIZERS

NATIONAL AIRLINES

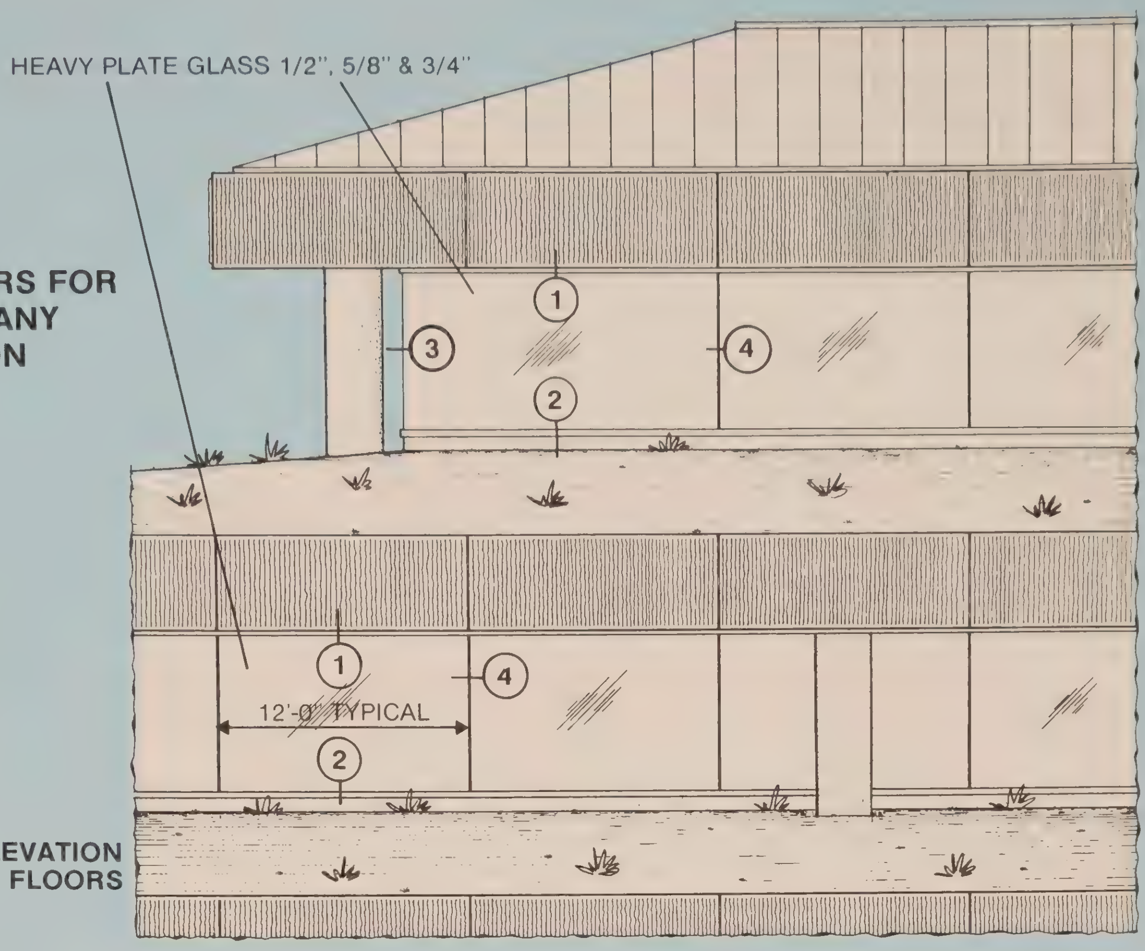

CONCRETE
3/16" STEEL PLATE
NEOPRENE GASKET W/CAULKING
F.H.M.S.
14 GAUGE STAINLESS STEEL CLOSURE
NEOPRENE GASKET WITH SEALANT
1
3/8" PLATE GLASS MAIN LIGHTS
1
3
4
2
3
EXPANSION JOINT
PARTIAL ELEVATION
7/8" HEAVY PLATE GLASS STABILIZER
DIFFUSER
3/8" HEAVY PLATE GLASS
7/8" GLASS STABILIZER
NEOPRENE GASKET WITH SEALANT
METAL CLOSURE
INSULATION
NEOPRENE SETTING BLOCK
2-1/2" x 2-1/2" x 3/8" STEEL ∠ FRAME
2-1/2" x 2-1/2" x 3/8" CONT.
4
3/8" PLATE GLASS MAIN LIGHTS
SILICONE SEALANT W/1/8" THICK NEOPRENE SPACERS
7/8" HEAVY PLATE GLASS STABILIZER
SILICONE
3/8" HEAVY PLATE GLASS MAIN LIGHTS
SILICONE SEALANT W/1/8" THICK NEOPRENE SPACERS
7/8" HEAVY PLATE GLASS STABILIZER
2
VINYL TUBE
SILICONE
7/8" HEAVY PLATE GLASS STABILIZER
3
3/8" PLATE GLASS MAIN LIGHTS

BUTT-JOINT GLAZING

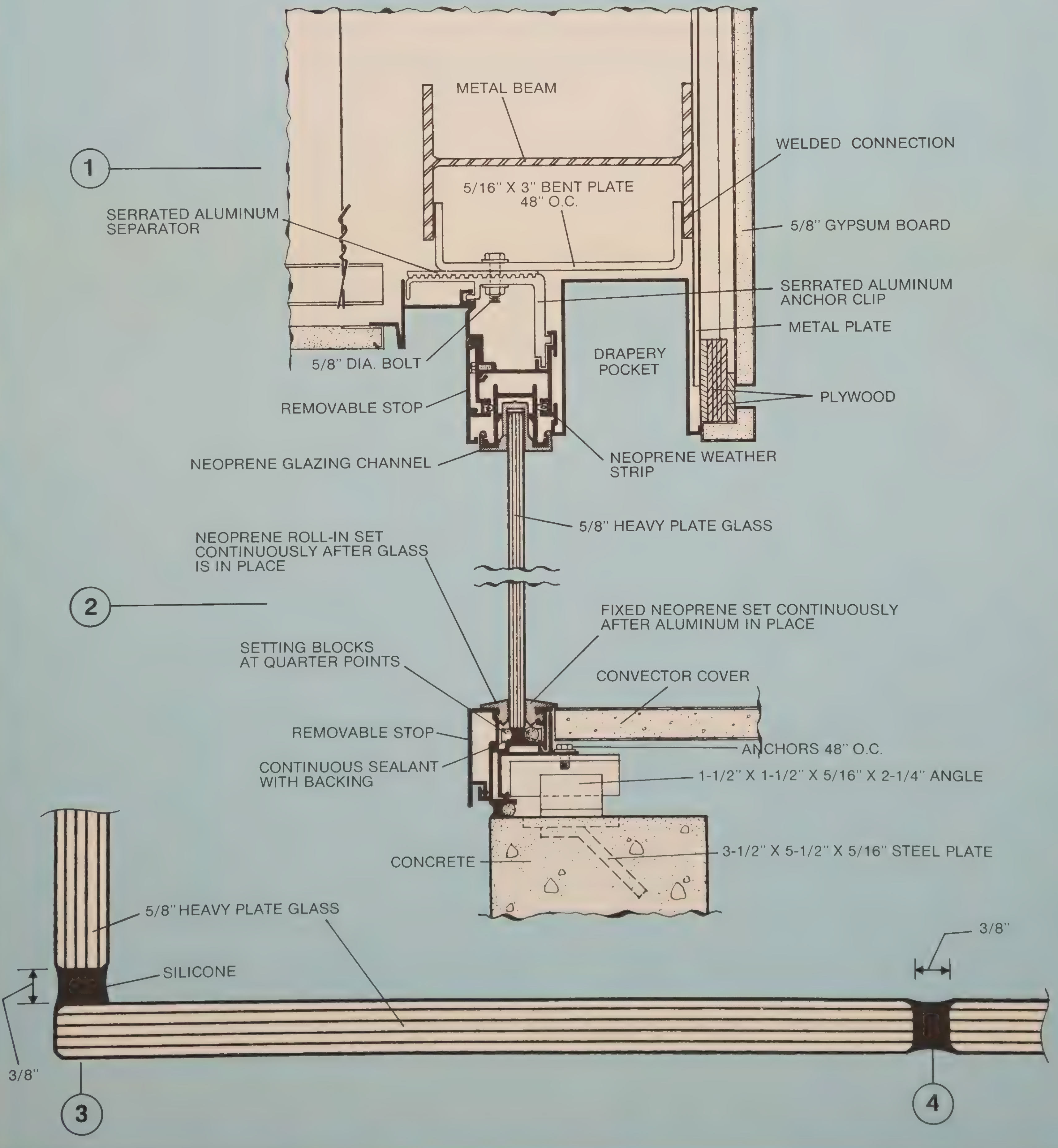
WEYERHAEUSER HEADQUARTERS BUILDING

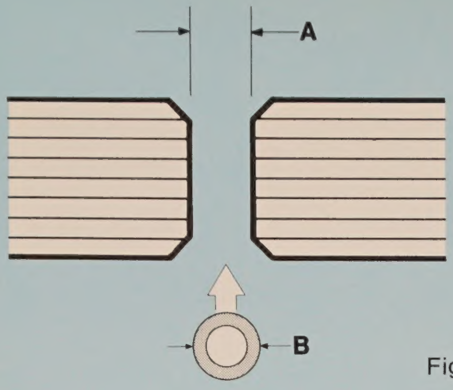
LIBBEY-OWENS-FORD COMPANY, 811 Madison Avenue, Toledo, Ohio 43695
(419) 242-5781
District Offices
ATLANTA, GEORGIA 30309, 1819 Peachtree Road, N.E.,
(404) 355-2410
BOSTON (Chestnut Hill, Massachusetts 02167), 220 Boylston St.,
(617) 969-2900
BUFFALO (Amherst, New York 14226), 331 Alberta Drive,
(716) 838-3800
CHARLOTTE, NORTH CAROLINA 28209, 4530 Park Road, Suite 180,
(704) 525-4816
CHICAGO, ILLINOIS 60606, 10 S. Riverside Plaza, Room 822,
(312) 236-2490
CINCINNATI, OHIO 45241, 4055 Executive Park Drive,
(513) 961-8181
COLUMBUS, OHIO 43229, 665 E. Dublin-Granville Rd., Suite 202,
(614) 888-8740
DALLAS, TEXAS 75219, One Turtle Creek Village, Suite 424,
(214) 521-3782
DENVER, COLORADO 80202, 1700 Broadway, Suite 2106,
(303) 255-0395
DETROIT, MICHIGAN 48202, 610-611 Fisher Building,
(313) 875-0080
HOUSTON, TEXAS 77027, 2300 West Loop South, Suite 515,
(713) 621-1173
INDIANAPOLIS, INDIANA 46226, 8944 East 42nd Street, Suite 212,
(317) 897-4455 & 4456
LOS ANGELES, CALIFORNIA 90010, 3440 Wilshire Boulevard,
(213) 388-0641
KANSAS CITY (Prairie Village, Kansas 66206), 8340 Mission Road,
(913) 381-4686
MEMPHIS, TENNESSEE 38137, 5100 Poplar Avenue, Suite 2023,
(901) 682-4684
MIAMI (Fort Lauderdale, Florida 33311), 2530 W. Oakland Park Blvd., Suite 10-B
(305) 731-8980, (Miami (305) 949-1188)
MILWAUKEE (Wauwatosa, Wisconsin 53226), 11430 West Bluemound Road,
(414) 475-5700
MINNEAPOLIS, MINNESOTA 55435, 6750 France Avenue, Suite 324
(612) 920-5200
NEW ORLEANS (Metairie, Louisiana 70002), 3525 No. Causeway Blvd
(504) 835-0381
NEW YORK (Fort Lee, New Jersey 07024), 222 South Marginal Road,
(201) 947-8000
OMAHA, NEBRASKA 68102, 110 North 14th Street, Suite 628,
(402) 341-4310
PHILADELPHIA (Bryn Mawr, Pennsylvania 19010), 14 South Bryn Mawr Avenue,
(215) 477-4120
PHOENIX, ARIZONA 85015, 1600 West Camelback Road, Suite 2-F,
(602) 264-9097
PITTSBURGH, PENNSYLVANIA 15237, 7805 McKnight Road, Suite 103,
(412) 366-7722
RICHMOND, VIRGINIA 23225, 6767 Forest Hill Avenue, Suite 306,
(804) 358-4906
ST. LOUIS, MISSOURI 63141, 11710 Administration Drive,
(314) 567-4416 & 4417
SALT LAKE CITY, UTAH 84111, 140 W. 2100 South, Suite 114,
(801) 467-8681
SAN FRANCISCO (San Mateo, California 94402), 66 Bovet Road, Suite 380,
(415) 341-7221
SEATTLE (Bellevue, Washington 98007), 14042 N. E. 8th,
(206) 747-9730
TOLEDO, OHIO 43614, 3536 Glendale Avenue, Suite F,
(419) 242-5781
WASHINGTON, D.C. 20006, 900 17th Street, N.W.,
(202) 296-5051

CORPORATE HEADQUARTERS FOR WEYERHAEUSER COMPANY TACOMA, WASHINGTON



PARTIAL ELEVATION 4TH & 5TH FLOORS


1
METAL BEAM
WELDED CONNECTION
5/16" X 3" BENT PLATE 48" O.C.
5/8" GYPSUM BOARD
SERRATED ALUMINUM SEPARATOR
SERRATED ALUMINUM ANCHOR CLIP
METAL PLATE
5/8" DIA. BOLT
DRAPERY POCKET
PLYWOOD
REMOVABLE STOP
NEOPRENE GLAZING CHANNEL
NEOPRENE WEATHER STRIP
5/8" HEAVY PLATE GLASS
NEOPRENE ROLL-IN SET CONTINUOUSLY AFTER GLASS IS IN PLACE
2
FIXED NEOPRENE SET CONTINUOUSLY AFTER ALUMINUM IN PLACE
SETTING BLOCKS AT QUARTER POINTS
CONVECTOR COVER
REMOVABLE STOP
ANCHORS 48" O.C.
CONTINUOUS SEALANT WITH BACKING
1-1/2" X 1-1/2" X 5/16" X 2-1/4" ANGLE
CONCRETE
3-1/2" X 5-1/2" X 5/16" STEEL PLATE
5/8" HEAVY PLATE GLASS
SILICONE
3/8"
3/8"
3
4



Glass Thickness	Thickness Tolerance	Dimensional Tolerance	Joint Width (A)	Tube Dia. (B)
3/8"	±1/32"	±3/32"	1/8"—3/16"	3/16"
1/2"	±1/32"	±1/8"	3/16"—1/4"	1/4"
5/8"	+1/32"—3/64"	±5/32"	1/4"—5/16"	5/16"
3/4"	+1/32"—3/64"	±3/16"	5/16"—3/8"	3/8"
7/8"	+3/64"—1/16"	±7/32"	5/16"—3/8"	3/8"

Figure 2

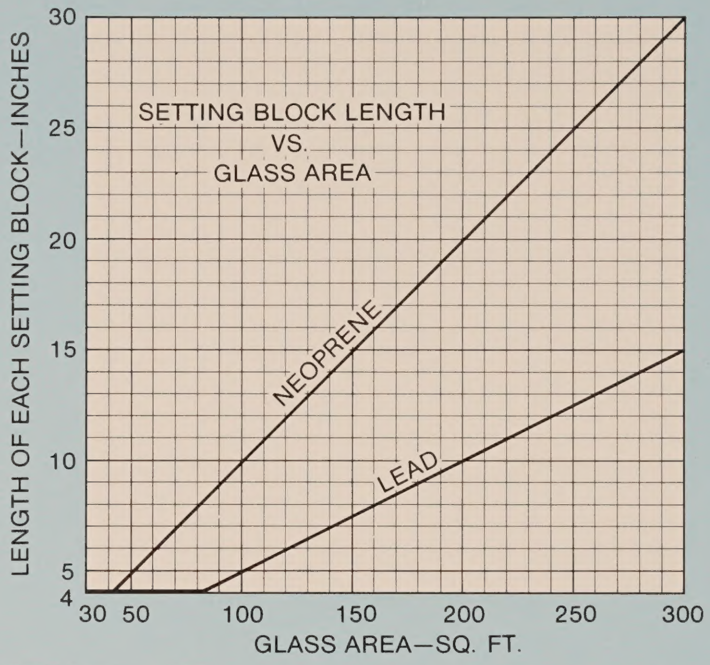


Figure 4

Glazing Guidelines, contd.

A weathertight seal should be installed between the face of the glass and the glazing stops. A void should be left between the edge of the glass and the glass framing. If a heel bead is required for proper weather seal, it should be of a permanently pliable material and should not fill the edge void or interfere with the operation of the weepage system.

Sealants

Dow-Corning 781 Silicone Sealant or equivalent silicone sealant by others is recommended for the butt joint. Consult the sealant manufacturer for additional information. A polyethylene filler tube is recommended as a backup for the silicone.

Suggested Specification

Where butt-joint glazing is designated on the drawings, glass shall be Libbey-Owens-Ford Parallel-O-Plate or Parallel-O-Float, Parallel-O-Grey, or Parallel-O-Bronze (specifier to select glass type) in thicknesses and sizes shown on the drawings. Quality shall meet the requirements of Federal Specification DD-G-451c.

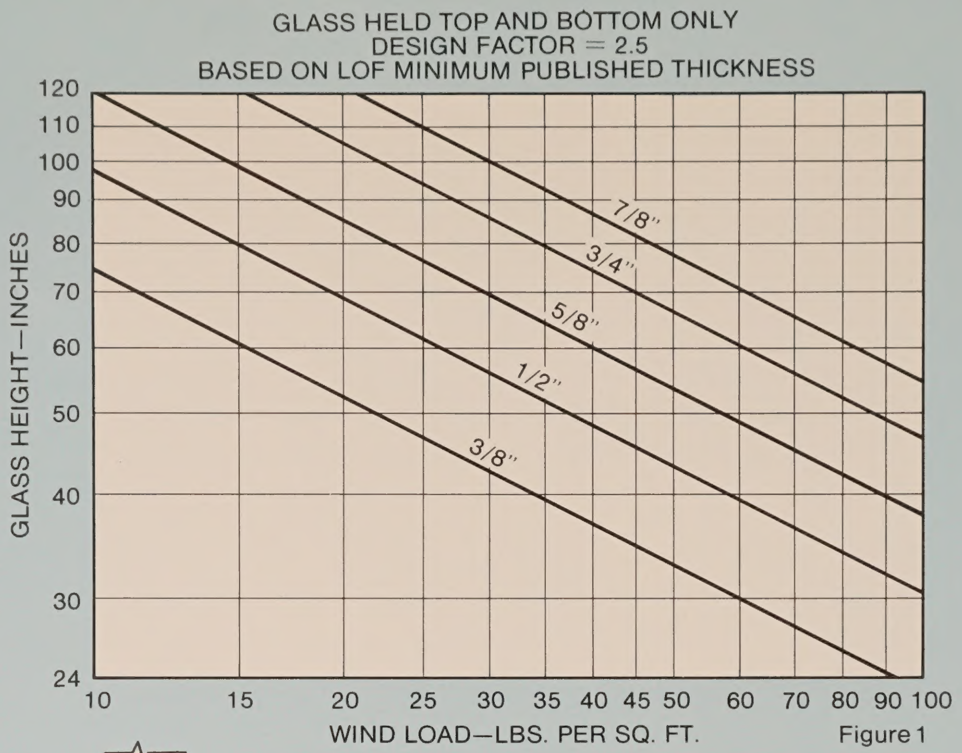
Sealants shall be as specified in Section __________. Sealants manufacturer's preparation and application instructions are to be followed without exception.

Glass Fabrication

For glass 1/2" or greater in thickness all vertical edges are saw-cut with seamed edges at the factory and the horizontal edges may be wheel-cut or saw-cut at the option of the glass manufacturer. Glass 3/8" thick will be furnished with vertical edges wheel cut and seamed only.

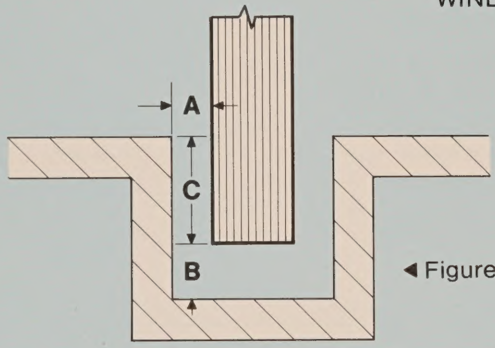
Additional Information

Additional information pertaining to glass and glazing may be found in the current issue of LOF's Glass for Construction available in Sweet's file Li-8.26.



GLASS HELD TOP AND BOTTOM ONLY
DESIGN FACTOR = 2.5
BASED ON LOF MINIMUM PUBLISHED THICKNESS

Figure 1



◄ Figure 3 ►

Glass Thickness	Minimum Clearance		Cover on Glass
	A Face	B Edge	C
3/8"	3/16"	5/16"	7/16"
1/2"	1/4"	3/8"	7/16"
5/8"	1/4"	3/8"	1/2"
3/4"	1/4"	1/2"	5/8"
7/8"	1/4"	1/2"	3/4"

Note: The cover (C) for heat absorbing glass should not be exceeded.

The following technical data is presented as a guideline in preparing designs and details for two-edge support systems. A Libbey-Owens-Ford representative will be pleased to assist you with design, detailing, specifications, and budget information.

Glass Selection

Figure #1 is a glass selection chart for glass held top and bottom and includes vertical spans from 2'0" to 10'0" and wind loads 10 to 100 lbs./sq. ft. The chart is based on a design factor of 2.5. Tempered or laminated glass is not recommended for two-edge support systems.

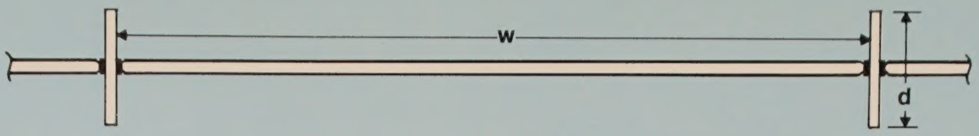
Tolerances and Edgework

The vertical edges at the butt joint are to be specified as sawed and seamed for glass thicknesses of 1/2" or greater. Where 3/8" thick glass is required the vertical edges are to be wheel cut and seamed. Any exposed edges such as corners should be specified with flat polished edges. Mitered edges at corners are not recommended. Thickness and dimensional tolerances, joint width, and diameter of polyethylene filler tube are shown in Figure 2.

Glazing Guidelines

Recommended clearances and cover for glass held top and bottom can be found in Figure 3.

Setting blocks are recommended to be Neoprene with 90 Shore A Durometer hardness. Lead setting blocks are to be used for very large thick plate or float glass. The length of the setting blocks can be determined by using Figure 4. The length of each block should not be less than 4". The setting blocks should be located at quarter points; however, if this is impractical, they may be moved to within 6" of the glass edge but never closer to the edge than 1/8 of the glass width. The blocks should always be equidistant from the center of the glass.



STABILIZER DEPTH SELECTION CHART

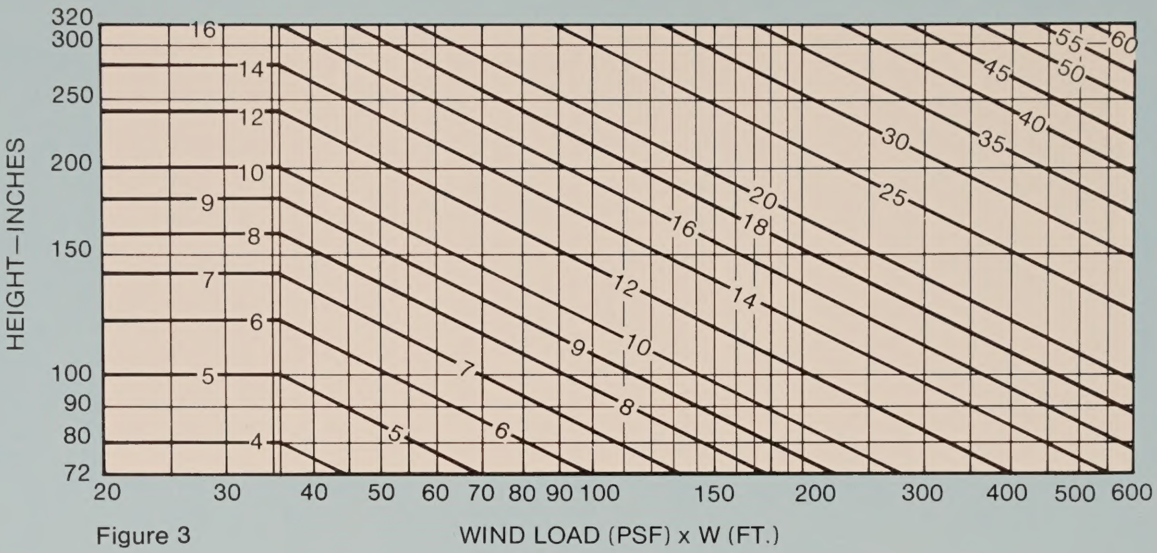


Figure 3

EXAMPLE: a light of glass 12'-6" high by 8'-0" wide with a design load of 20 PSF would require a 3/4" stabilizer 16" in width.

A. Find glass height in inches on left hand side of chart. Example: 12'-6" glass height = 150".

B. Determine horizontal reference point by multiplying the wind load (PSF) and glass width in feet. Example: 20 PSF x 8'-0" = 160.

C. Answer is read at the conversion point on the chart. Example indicates that a stabilizer 16" in width is required.

RULES: d = stabilizer depth in inches. Note: (d) is not less than 1/20 of glass height and (d) is not less than 4".

w = glass width (in feet) between stabilizers on a single light of glass.

Selection of Glass Stabilizer Depth
Glass 3/4" thick is recommended for the glass stabilizers. Stabilizers selected from the shaded area of Figure 3 require application review by LOF's Technical Department.

Tolerances and Edgework
The vertical edges of the main plates are to be specified as sawed and seamed only for thicknesses of 1/2" or greater. Glass 3/8" thick will be furnished wheel-cut and seamed. The vertical edges of the stabilizers are to be flat polished. Thicknesses and dimensional tolerances and joint width are shown in Figure 2.

Sealants
The sealant recommended for the butt joint to stabilizers is Dow-Corning 781 silicone sealant or equivalent sealant by others.

Glazing Guidelines
The same glazing guidelines as found in butt joint glazing apply to butt joint glazing with stabilizers.

Specifications
As installation is critical for any system of this nature it is recommended that an LOF representative be contacted to assist in proper specification preparation.

BUTT-JOINT GLAZING WITH STABILIZERS

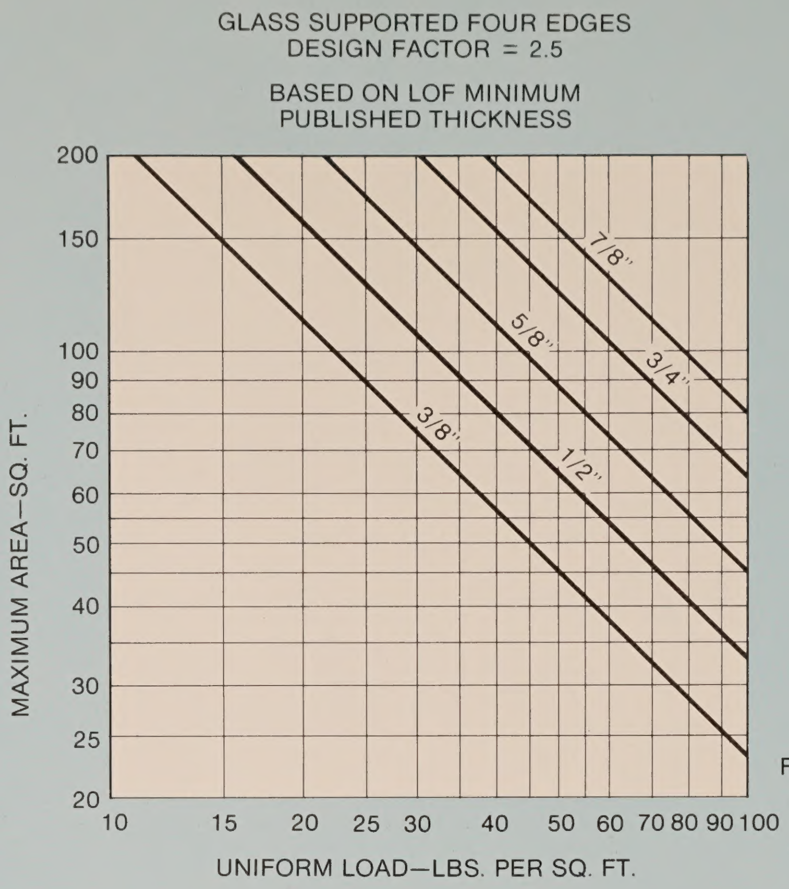
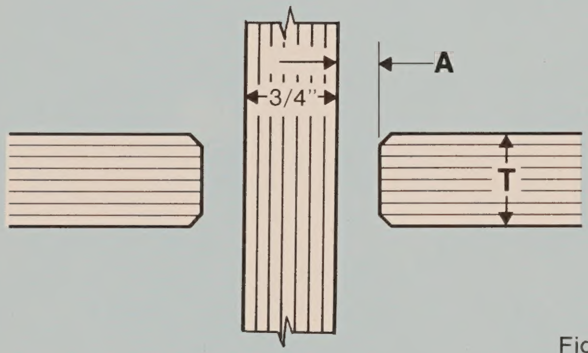


Figure 1



Glass Thickness (T)	Thickness Tolerance	Dimensional Tolerance	Joint Width (A)
3/8"	±1/32"	±3/32"	1/8"—3/16"
1/2"	±1/32"	±1/8"	3/16"—1/4"
5/8"	+1/32"—3/64"	±5/32"	1/4"—5/16"
3/4"	+1/32"—3/64"	±3/16"	5/16"—3/8"
7/8"	+3/64"—1/16"	±7/32"	5/16"—3/8"

Figure 2

The following technical data is presented as a guideline in preparing preliminary designs for butt joint glazing with stabilizers. Due to structural considerations it is important that a Libbey-Owens-Ford representative be contacted to assist you with final design, detailing, specifications, and budget information.

Glass Selection

Due to thermal characteristics clear annealed plate or float glass only is recommended for use in this glazing system. Tinted, coated, or laminated glasses are not recommended. Figure 1 is a glass selection chart for the main plates and includes glass area from 20 to 200 sq. ft. and wind loads from 10 to 100 lbs./sq. ft. The chart is based on a design factor of 2.5.

Recommended spacings between the stiffeners and the large glass plates are shown in Figure 2. The indicated spacings are shown to provide the optimum width to depth ratio for the sealant.